SAWTOOTH FISH HATCHERY AND EAST FORK SATELLITE

1984 Chinook Salmon Brood Year Report and 1985 Steelhead Brood Year Report

Prepared for U.S. Fish and Wildlife Service
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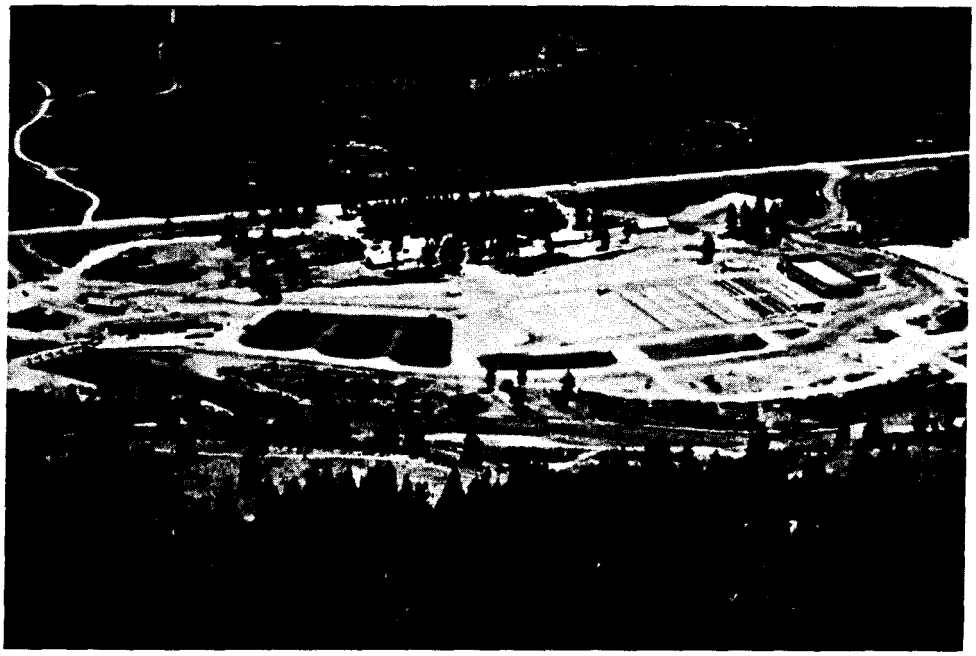

By

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1984 Brood Year Report

Spring Chinook Salmon

HATCHERY DESCRIPTION

Sawtooth Fish Hatchery is part of the Lower Snake River Compensation Plan, and the hatchery has been in full operation since February 1985. The mitigation goals are for 2,400,000 spring chinook smolts to be released each year and 4,500,000 steelhead eggs which are to be reared at Hagerman National Hatchery and Magic Valley Hatchery when the latter is completed. A satellite station located on the East Fork of the Salmon River includes trapping, holding, and spawning facilities for salmon and steelhead adults.

Sawtooth Hatchery operates on water from the Salmon River and three production wells. The wells provide 7.8 cfs and maintain a minimum temperature of 40 F in the winter up to 50 F during the latter part of the summer. The river provides up to 35 cfs of water with temperature variations from 32 F to 68 F.

The production facilities include: 100 FAL incubator stacks containing 800 trays, 16 Indoor rearing vats each with 400 cubic feet of rearing space, 12 outside fry raceways each with 750 cubic feet of rearing space, and 28 final rearing raceways each with 3,600 cubic feet of rearing space. The lower sections of the raceways have serial re-use water from the top sections. The adult fish facility consists of a fish weir, a trap, and three adult fish holding ponds each with 4,500 cubic feet of holding area. A spawning area is located at the upper end of the holding ponds.

The rearing water from the river enters an intake structure located one half mile upstream from the hatchery and runs through a 54-inch pipe to a control box located in the hatchery building, where final screening of the rearing water is accomplished. Water is then distributed to the indoor vats, outside raceways, or adult fish facility. Incubation water is provided by a production well with river water back-up through a check valve. Inside vats may utilize either well or river water with excess well water spilled back into the control box for use in the outside raceways.

1984 SPRING CHINOOK ADULT RETURNS

The 1984 Sawtooth chinook adults returned from two smolt releases plus natural escapement. A total of 18,480 smolts were released in 1982, and in 1983 a total of 167,895 were planted (see Table 1).

Table 1. Sawtooth Hatchery smolt release and adult chinook returns.

Brood year	Release year	Number released	Jacks	4 year olds	5 year olds	Total returned*	Percent returned
1979	1981	None			291	Incomplete	
1980	1982	18,480	17	66	165	248	1.3428
1981	1983	167,895	49	1,182			
1982	1984	230,550	292				
1983	1985	420,060					
1984	1986	347,481					

*Includes an unknown number of wild fish.

A temporary fish weir and trap was installed at the Sawtooth Hatchery site on July 7, 1984 and was kept in operation through September 6, 1984. The trap was checked daily and fish transferred to the holding pond or released. A total of 406 spring chinook were trapped, which included 219 males and 187 females (see Figure 1) for run timing).

Age composition of the returning adults was done using length data. Jacks were classed as 53.3 cm (21"), four year olds were 55.9 cm (22") to 78.7 cm (31"), and five year olds were 81.3 cm (32") and longer. We received 49 Jacks, 66 four year olds, and 291 five year old chinook for a total of 406 trapped (see Table 2 and Figure 2 for length frequency distribution).

We held 122 females and 79 males for spawning. The remaining 65 females and 140 males were released to spawn naturally.

The 1984 East Fork chinook adults returned from natural escapement (see Table 3 and Figure 3).

The East Fork station began trapping spring chinook salmon on June 20, 1984 and quit on August 7, 1984. The trap was checked daily, and the fish were transferred to the holding ponds or released. A total of 117 chinook were trapped, which included 35 females and 82 males (see Figure 4 for run timing).

Age composition of the East Fork run included: 22 jacks, 26 four year olds, and 69 five year old chinook. We held 24 males and 28 females for spawning and released 58 males and 7 females to spawn naturally (see Table 4 for length frequency distribution).

CHINOOK SPAWNING

Spawning operations began at Sawtooth on August 6, 1984 and continued on a biweekly basis through August 30, 1984. A total of 100 females were spawned for a total egg take of 601,671 green eggs.

East Fork spawning began on August 7, 1984 and ended on August 28, 1984. A total of 25 females were spawned, and a total of 171,308 green eggs were taken for an average fecundity of 6,852 eggs per female.

Chinook eggs were taken by incision into a colander to drain off the ovarian fluid. Eggs from three females were then placed into a spawning bucket and fertilized with the pooled sperm from five males. Males for spawning included 1% to 3% jacks. The fertilized eggs were allowed to set for one to three minutes, then rinsed and water hardened in 2 ppm erythromycin for one hour.

Figure 1. Sawtooth Daily Trap Count - 1984 - Spring Chinook Salmon.

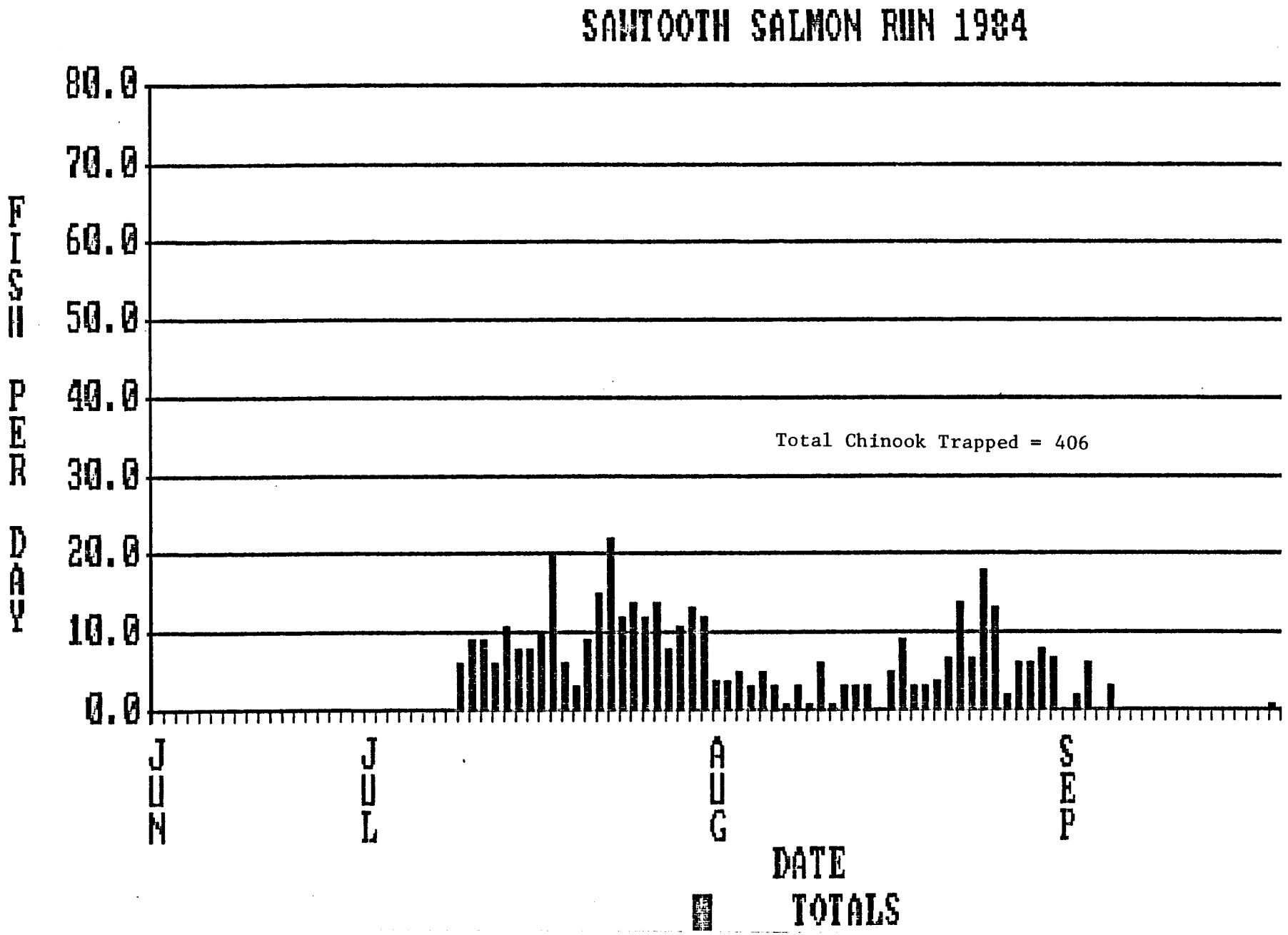


Table 2. Length frequency distribution of Sawtooth spring chinook, 1984.

Length cm	Length in.	Fish trapped
43	17	2
46	18	7
48	19	10
50	20	17
53	21	13
55	22	11
58	23	10
60	24	3
63	25	2
66	26	6
68	27	3
71	28	6
73	29	7
76	30	9
78	31	9
81	32	5
83	33	4
86	34	9
88	35	7
91	36	28
93	37	37
96	38	50
99	39	44
101	40	34
104	41	21
107	42	22
109	43	14
112	44	8
114	45	6
117	46	1
119	47	1
Total		406

Figure 2. 1984 Sawtooth Spring Chinook Length Frequency.

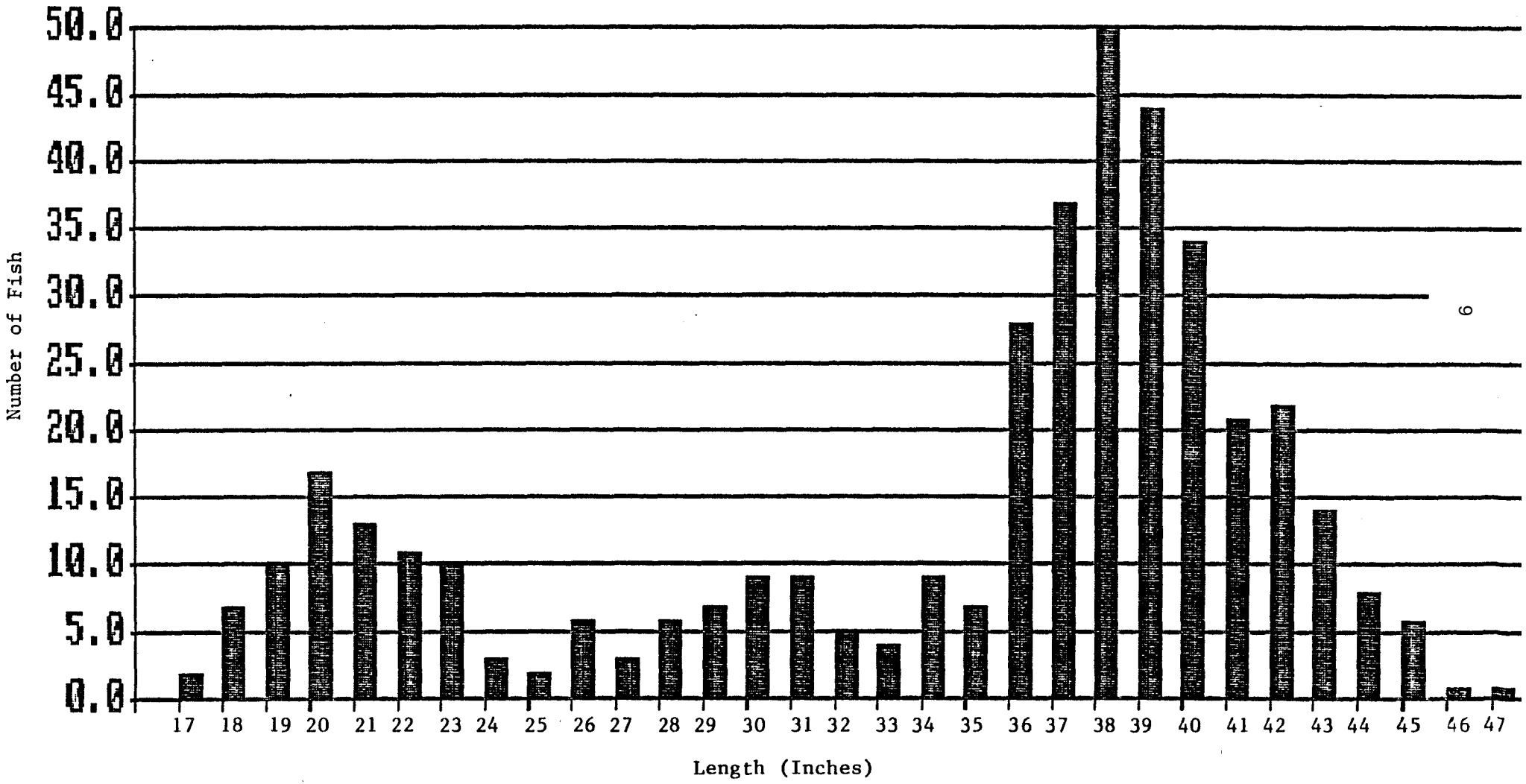


Table 3. East Fork Satellite smolt release and adult chinook returns since 1984.

Brood year	Release year	Number released	Jacks	4 year olds	5 year olds	Total returned*	Percent returned
1979	1981	0*			69	69	unk
1980	1982	0*		26	59	85	unk
1981	1983	0*	22	193			
1982	1984	0*	51				
1983	1985	0*					
1984	1986	108,690					

*Remnant population of wild fish.

Figure 3. 1984 East Fork Spring Chinook Length Frequency.

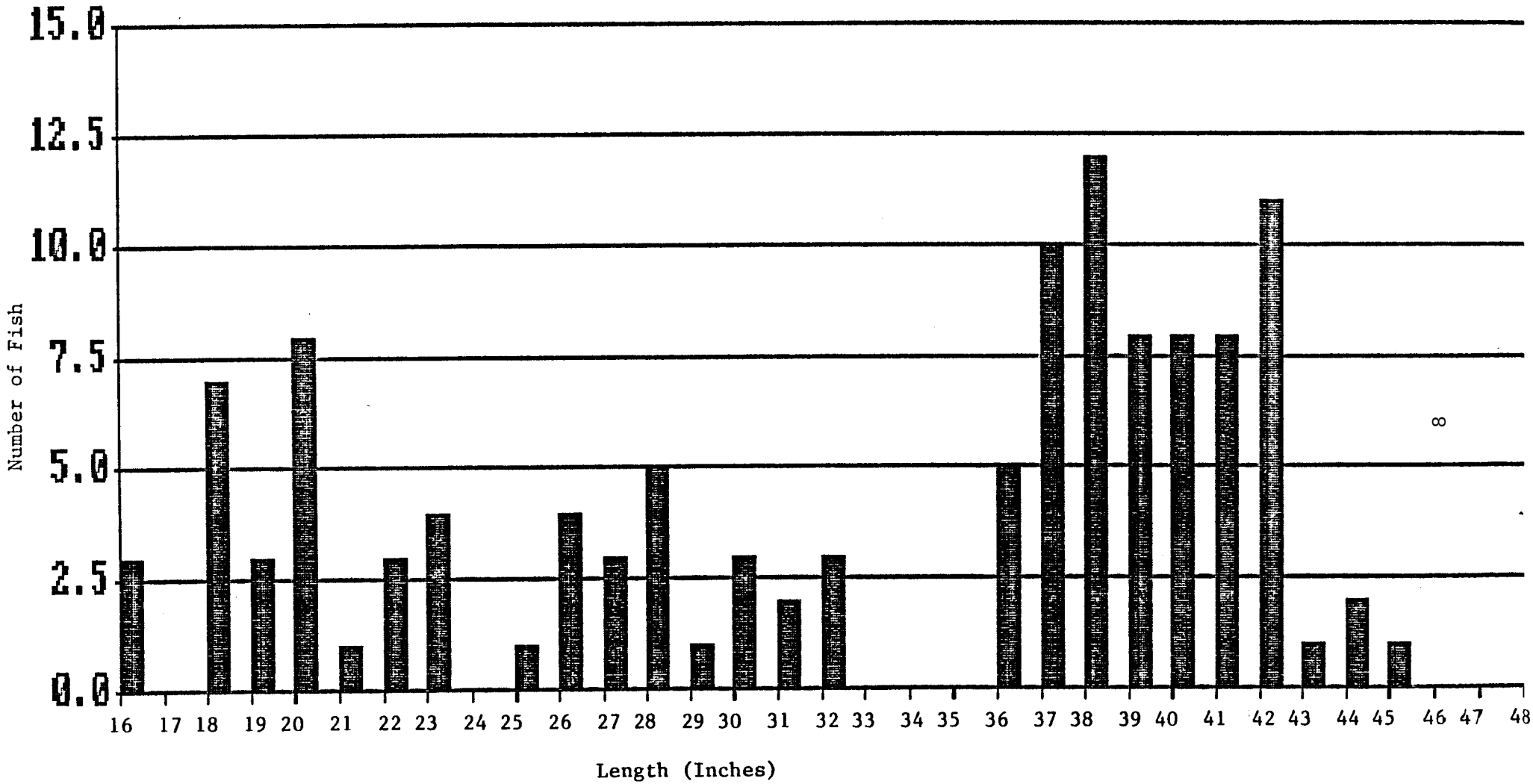


Figure 4. East Fork Daily Trap Count - 1984 - Spring Chinook Salmon.

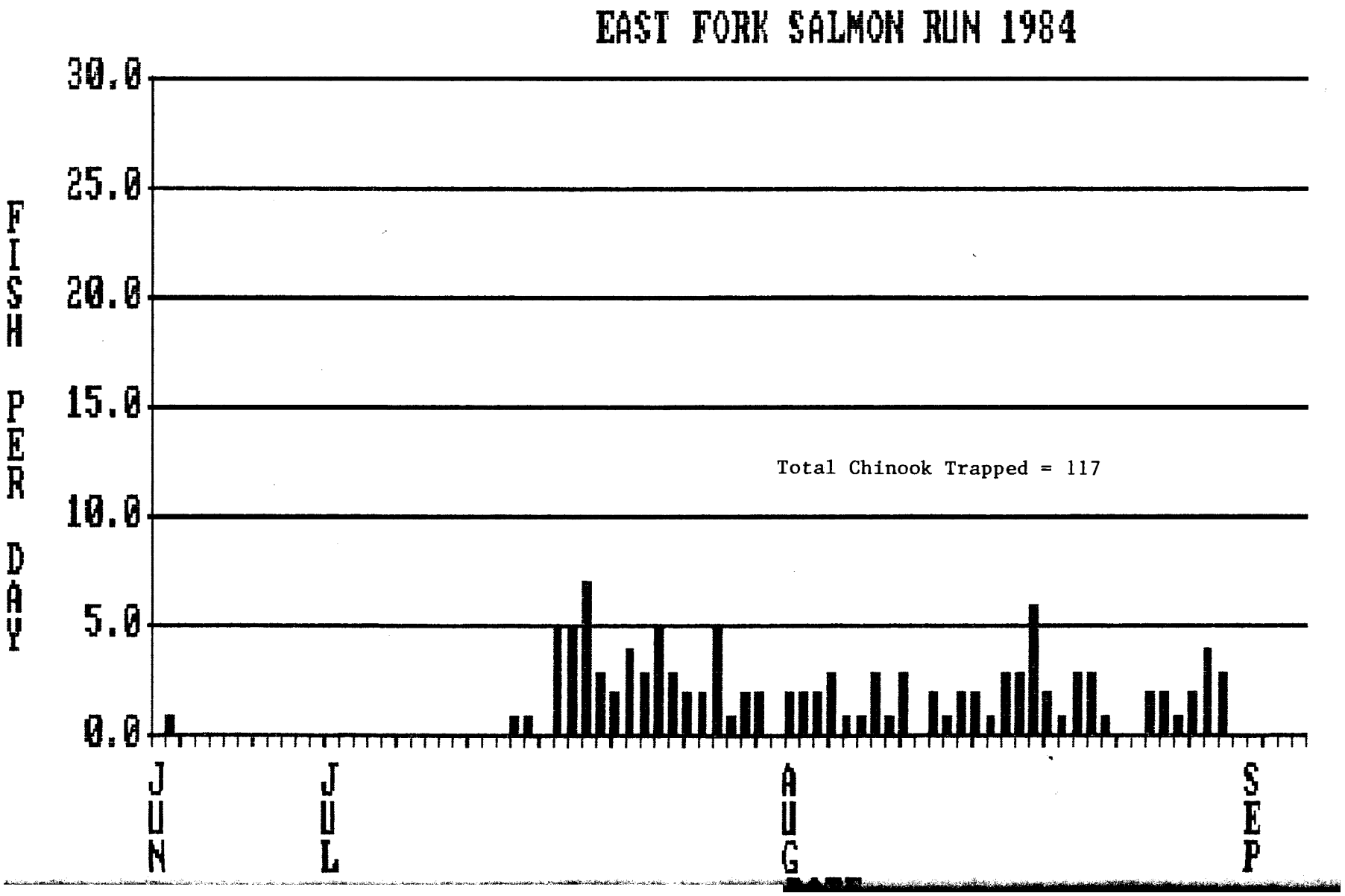


Table 4. Length frequency distribution of East Fork spring chinook, 1984.

Length cm	Length in.	Fish trapped
41	16	3
43	17	0
46	18	7
48	19	3
50	20	8
53	21	1
55	22	3
58	23	4
60	24	0
63	25	1
66	26	4
68	27	3
71	28	5
73	29	1
76	30	3
78	31	2
81	32	3
83	33	0
86	34	0
88	35	0
91	36	5
93	37	10
96	38	12
99	39	8
101	40	8
104	41	8
107	42	11
109	43	1
112	44	2
114	45	1
Total		117

CARCASS DISPOSITION

Sawtooth salmon carcasses were disposed of as follows: 99 given to the public, 48 given to the Sho-Ban Indian tribe, 1 used by the local conservation officer for bear bait, and 52 buried.

All East Fork carcasses were given to the public.

CHINOOK EGGS

After fertilization, the eggs were rinsed and packed into coolers, iced down, and driven to the Pahsimeroi Hatchery for incubation and early rearing. The eggs were put into Heath incubators at 100 ounces, or approximately 10,300 eggs per tray, at 5 gpm flow. The eggs eyed up at 500 temperature units. They were then shocked and picked. An eye-up percentage of 80% was attained, leaving 137,046 East Fork and 481,336 Sawtooth eggs to hatch. The eyed eggs then were measured back into the trays at 85 ounces, or 8,755 eggs per tray. The hatch began at 900 temperature units.

CHINOOK FRY

The swim-up chinook fry were moved to the outside raceways at Pahsimeroi Hatchery when most of the yolk was absorbed, which occurred at approximately 1,650 temperature units. OMP-IV starter mash was mixed with 1/32" OMP-IV and fed when water temperatures were above 36 F and the fry were active.

On February 29, 1985, the last group of Sawtooth spring chinook fry, approximately 55,000, were returned to Sawtooth as a test lot to determine growth rates under the early rearing cycle at Sawtooth. They were introduced into the vats directly from the incubator trays from Pahsimeroi and started on a feed schedule of OMP-IV starter mash. OMP-IV 1/32" was mixed with the starter mash after one week, and they were switched to 1/32" after two weeks. These fish were divided intc two vats and kept at a density index of below .34 and a f l ow index of below .58 and grew at a rate of .312 inches per month. The fish at Sawtooth were larger than the chinook held at the Pahsimeroi Hatchery when the remaining chinook were returned for final rearing (see Figure 5 for rearing water temperatures and Figure 6 for growth rates).

When the Sawtooth and East Fork fish from Pahsimeroi reached 500 fish per pound, they were returned to Sawtooth. This operation was completed on April 1, 1985. We received a total of 401,884 Sawtooth and 120,960 East Fork chinook fry. They were transferred to the indoor rearing vats at a loading density index of .19 and a flow index of .56.They were split or given more rearing space when the density

Figure 5. 1984 Spring Chinook Brood Year Rearing Water Temperatures.

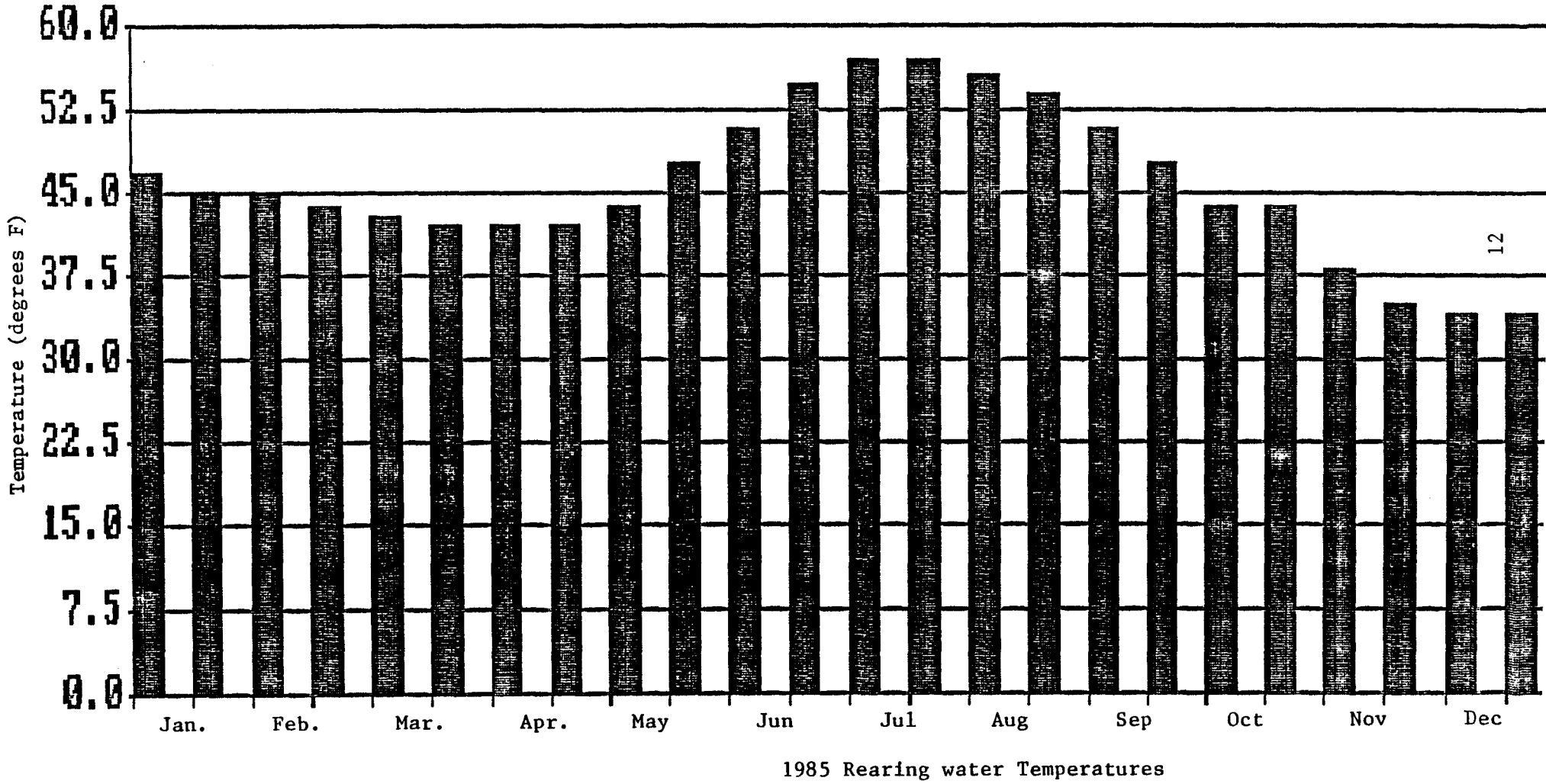
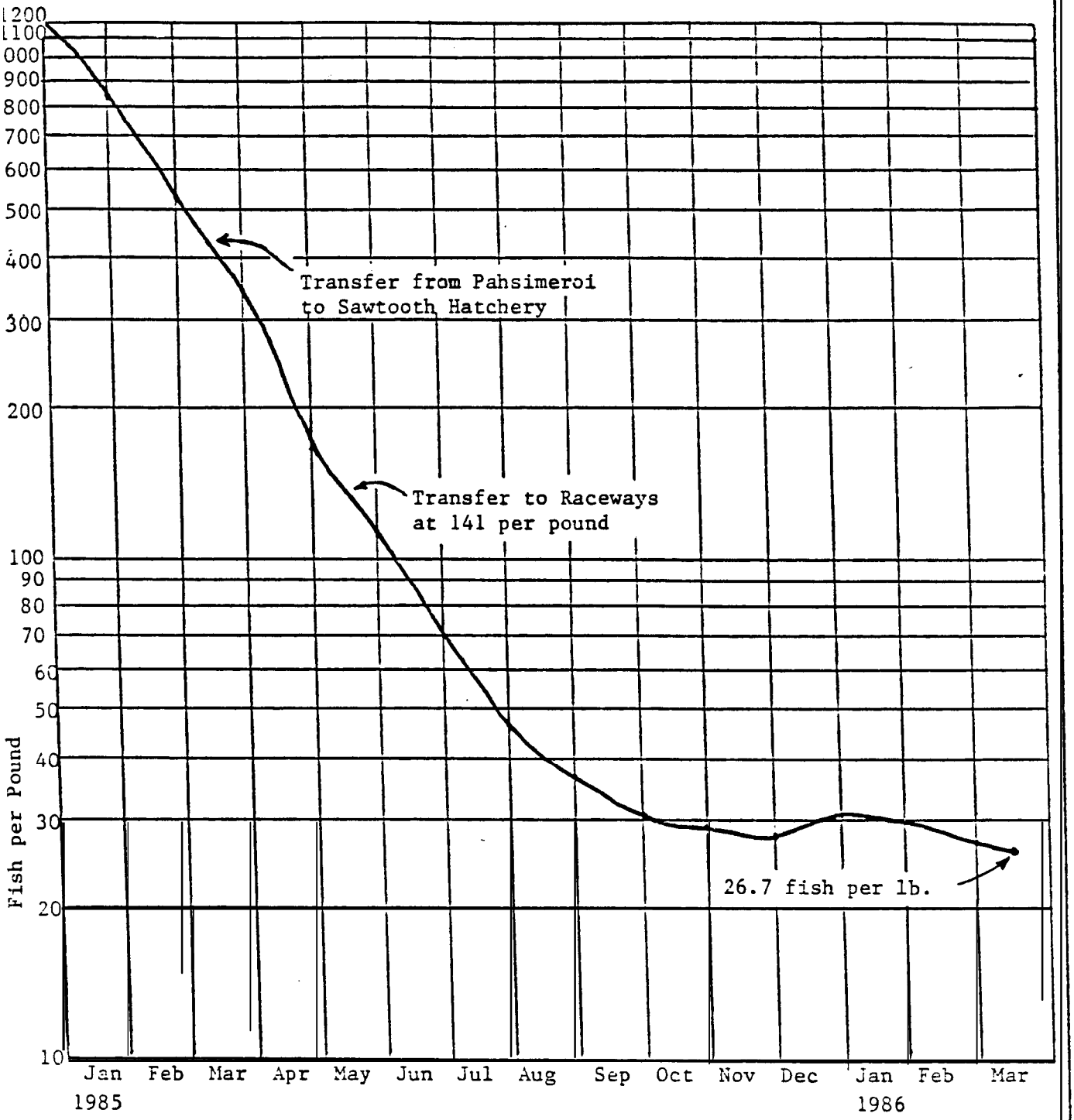


Figure 6. Growth Rate for 1984 Brood Year.



index reached .46 and the flow index reached 1.12. These fry were started on 1/32" OMP-IV feed and fed hourly. When they reached 425 per pound, they were switched to 3/64" OMP-IV and fed hourly.

When the chinook fry were received from the Pahsimeroi, they were infected with bacterial gill disease. Benzalkonium chloride was administered at a rate of 2 ppm in a one hour drip, three times a week for two weeks. This cleared up the problem.

Due to outside raceway construction, the 1984 brood year fry remained in the vats until the last of May, 1985.

CHINOOK FINGERLINGS

The final rearing raceways were set at 900 gpm flow and loaded at 100,000 fish per raceway in the top sections and 75,000 fish per raceway in the lower sections which was per design criteria. They were approximately 141 fish per pound or 6.8 cm (2.69") in length at loading (see Figure 6).

Some chemotherapy was necessary to maintain the fingerlings in good health. On July 6, 1985, we treated all fingerlings for Hexamita with a three-day treatment of Epsom salts, which was orally administered. We top dressed feed with erythromycin in July for 12 days to help prevent the spread of kidney disease. This treatment seemed to have put the fish off feed somewhat. In August 1985, when the fingerlings reached 50 fish per pound, they were switched to 1/8" OMP-IV pellets
and kept on this diet for the remainder of the rearing period. In October, we treated coldwater disease for a 14-day period with oxytetracycline, top dressing the feed each day using a gelatin binder. This treatment seemed to work quite well and no other disease treatments were necessary on these fish.

CHINOOK TAGGING

During the first week in October 1985, a total of 81,258 Sawtooth fingerlings were coded wire tagged. A total of 35,851 were also freeze branded with RD "Y"-l. The codes used in the tagging operation included: 40,219 fish with data code 10/28/45 and 41,039 fish with data code 10/28/46. Tag retention was checked in March of 1986, and a tag loss was estimated at 2.95%. By subtracting tag loss and mortality, a total of 75,815 CWT fish were released as smolts including 34,467 freeze branded fish. There were no experiments involved in the tagging. Tagged fish were all part of the standard production release.

CHINOOK SMOLTS

In March of 1986, the 1984 brood year smolts were evaluated for disease by our pathologist, for stamina and condition by the National Marine Fisheries Service, and for descaling and size by Idaho Department of Fish and Game personnel. The smolts were in good condition with very little descaling problems. The disease evaluation determined 21.7% of Sawtooth smolts and 10% of the East Fork smolts were positive for kidney disease organisms, and all smolts were negative for virus. No other disease problems were noted.

The screens were pulled to release the Sawtooth chinook smolts on March 15, 1986. A total of 347,481 smolts, weighing 13,192 lbs., were released, They averaged 26.3 fish per pound and 118.5 mm (4.6") in length (see Figure 6). A total of 58% of the Sawtooth fish survived to the smolt release stage from the green eggs taken (see Table 5).

The East Fork chinook smolts were trucked to the East Fork site and released on March 18 and 19, 1986. A total of 108,690 smolts, weighing 3,882 lbs., were planted. They averaged 28 fish per pound and 112 mm (4.4") in length. A total of 63% of the East Fork fish survived to the smolt release stage from the green eggs taken (see Table 5).

PRODUCTION COSTS

The cost of producing the 1984 spring chinook at both the Sawtooth and East Fork facilities are summarized in Table 6. An overall conversion of 2.02 was attained on both groups of fish.

Table 5. Spring chinook percent survival from green eggs to release.

Green egg number	Eyed egg number	Percent survival	500 per lb. no.	Percent survival	Released smolts	Percent survival
Sawtooth fish						
601,671	481,336	80%	401,884	67%	347,481	58%
East Fork fish						
171,308	137,046	80%	120,960	71%	108,690	63%

Table 6. 1984 brood year spring chinook production costs.

Feed conversion and cost per pound of spring Chinook produced at the Sawtooth Hatchery. Includes both Sawtooth and East Fork fish.

Lbs. of fish produced	Lbs. of feed	Cost	Conversion	Cost per lb. produced
15,089*	30,496	$18,639	2.02	$1.24

*16,552 lbs. released—1,463 lbs. produced at the Pahsimeroi Hatchery not included.

Total operating and maintenance costs based on 1984-1985 Fish and Game fiscal budget.

Sawtooth		East Fork	
Personnel costs	41,393.96	Personnel costs	7,860.23
Operating costs	82,953.75	Operating costs	4,160.15
Capital outlay	3,901.65	Capital outlay	--
Program total	128,249.36*	Program total	12,020.38*

*Does not reflect the budget required to operate the hatchery when it is in full production.

Sawtooth Hatchery and East Fork Satellite

1985 Brood Year Report

Steel head

1985 STEELHEAD ADULT RETURNS

The 1985 Sawtooth adult steelhead returns were from 107,284 smolts released in 1982 and 364,616 smolts planted in 1983 from Hagerman National Hatchery. Some returns were also from natural spawning fish (see Table 7).

The Sawtooth fish trap was installed on March 14, 1985 and was operated through May 10, 1985. A total of 526 adults were trapped. This total included 149 males and 377 females. These fish consisted of 77 one-ocean A's, 390 two-ocean A's, and 59 "B" run fish (see Figure 7 for run timing, Table 8 and Fig. 8 for length frequency). The following criteria were used for determining age groups: one-half of the 66 cm (26") size and smaller were classified as one-ocean A's, the other half of the 66 cm (26") size up to and including 78 cm (31") were called two-ocean A's and only fish over 81 cm (32") were classified as B's.

The 1985 East Fork steelhead returns were from smolts released in 1982 and 1983 which included smolts released from Hagerman National Hatchery, Niagara Springs Hatchery, Magic Valley Hatchery, and natural fish (see Table 7).

The East Fork fish trap and velocity barrier was put into operation on March 15, 1985 and was operated through May 22, 1985. A total of 77 adult steelhead were trapped, including 47 males and 30 females. These fish consisted of 50 one-ocean A^ss, 24 two-ocean A's, and 3 "B" run fish (see Figure 9 for run timing, Figure 10 and Table 8 for length frequency).

STEELHEAD SPAWNING

Spawning operations began at Sawtooth Hatchery on April 6, 1985 and continued through May 2, 1985. A total of 1,516,294 green "A" eggs and 102,461 green "B" eggs were taken from 272 "A" females and 15 "B" females. Fecundity was 5,575 eggs per female on A's and 6,831 eggs per female on B's. We took a total of 1,618,755 green eggs in 11 spawning days.

The East Fork spawning operations began on April 16, 1985 and continued through May 2, 1985. A total of 122,612 green "A" eggs and 7,128 green "B" eggs were taken from 19 "A" females and 1 "B" female. There were 6,453 eggs per female on A's and 7,128 eggs per female on B's. We took a total of 129,740 green eggs in seven spawning days.

Table 7. Steelhead smolt releases.

Date released	Hatchery rearinq	Number	Marks	Stock
		Sawtooth		
1983	HNFH	40,573	5-13-33	A
1983	HNFH	40,538	5-13-34	A
1983	HNFH	26,173	RV	B
1982	HNFH	121,016	None	A
1982	HNFH	243,600	None	A
	Total	471,900		
		East Fork		
1983	HNFH	31,348	LV	A
1983	HNFH	38,864	10-24-60	B
1983	Magic Valley	49,140	None	B
1983	HNFH	162,723	None	B
1983	Niagara Spr.	42,250	None	B
1982	HNFH	58,384	None	B
	Total	382,709		

Figure 7. Run Timing, Adult Steelhead Trapped at Sawtooth Hatchery, 1985.

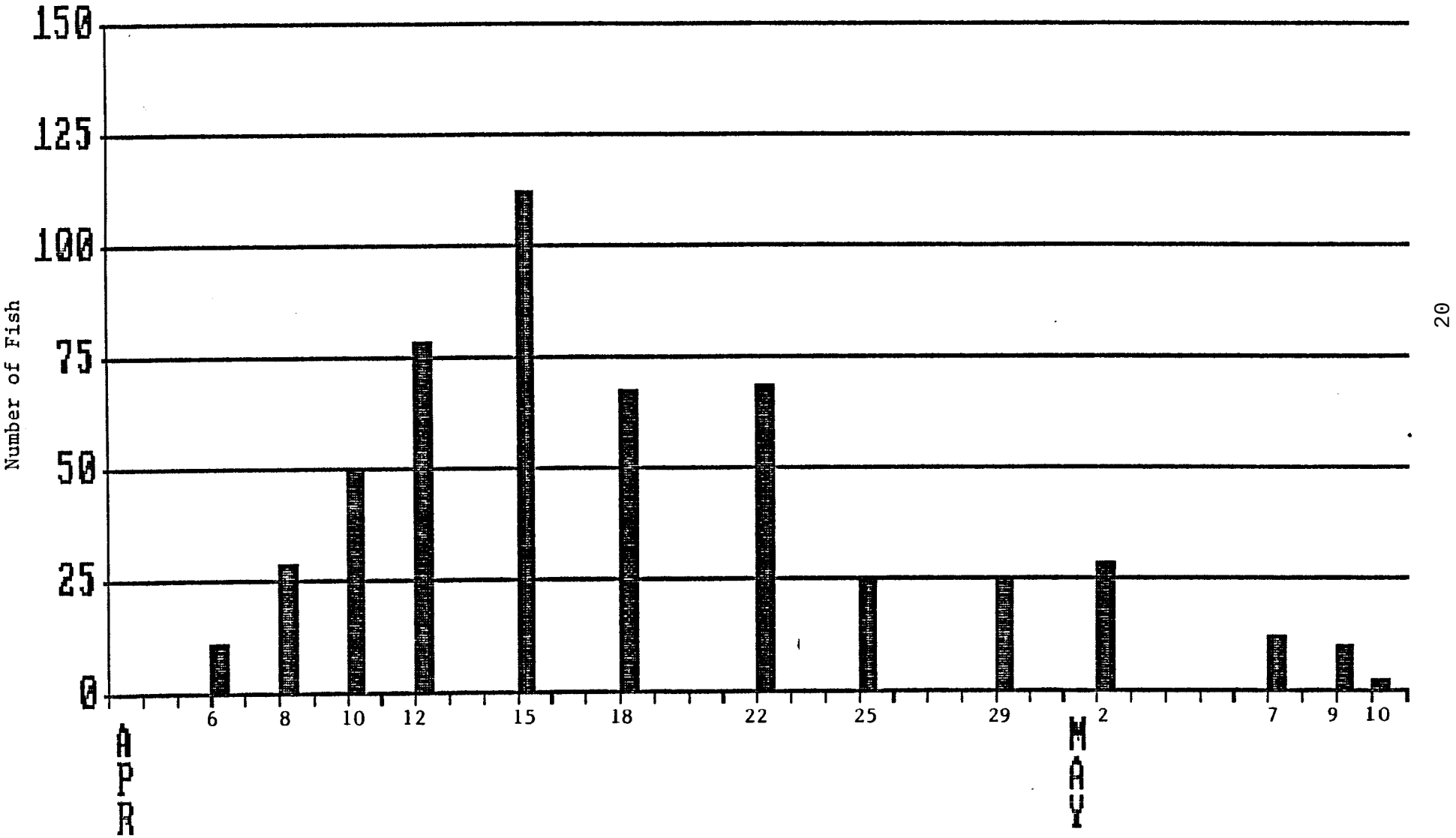


Table 8. Length frequency distribution for steelhead adults trapped at Sawtooth and East Fork facilities.

Lenqth cm (in.)*	Sawtooth (no.)	East Fork (no.)
41 (16)	0	1
43 (17)	0	0
46 (18)	0	0
48 (19)	0	0
511 (20)	0	1
53 (21)	0	5
56 (22)	3	10
58 (23)	11	11
61 (24)	17	15
64 (25)	24	10
66 (26)	42	5
69 (27)	59	7
71 (28)	83	2
74 (29)	104	4
76 (30)	81	3
79 (31)	43	1
81 (32)	32	1
84 (33)	12	1
86 (34)	13	0
89 (35)	1	0
91 (36)	0	0
94 (37)	1	0
Totals	526	77

*Length data for released fish is not available.

Figure 8. 1985 Sawtooth Steelhead Length Frequency.

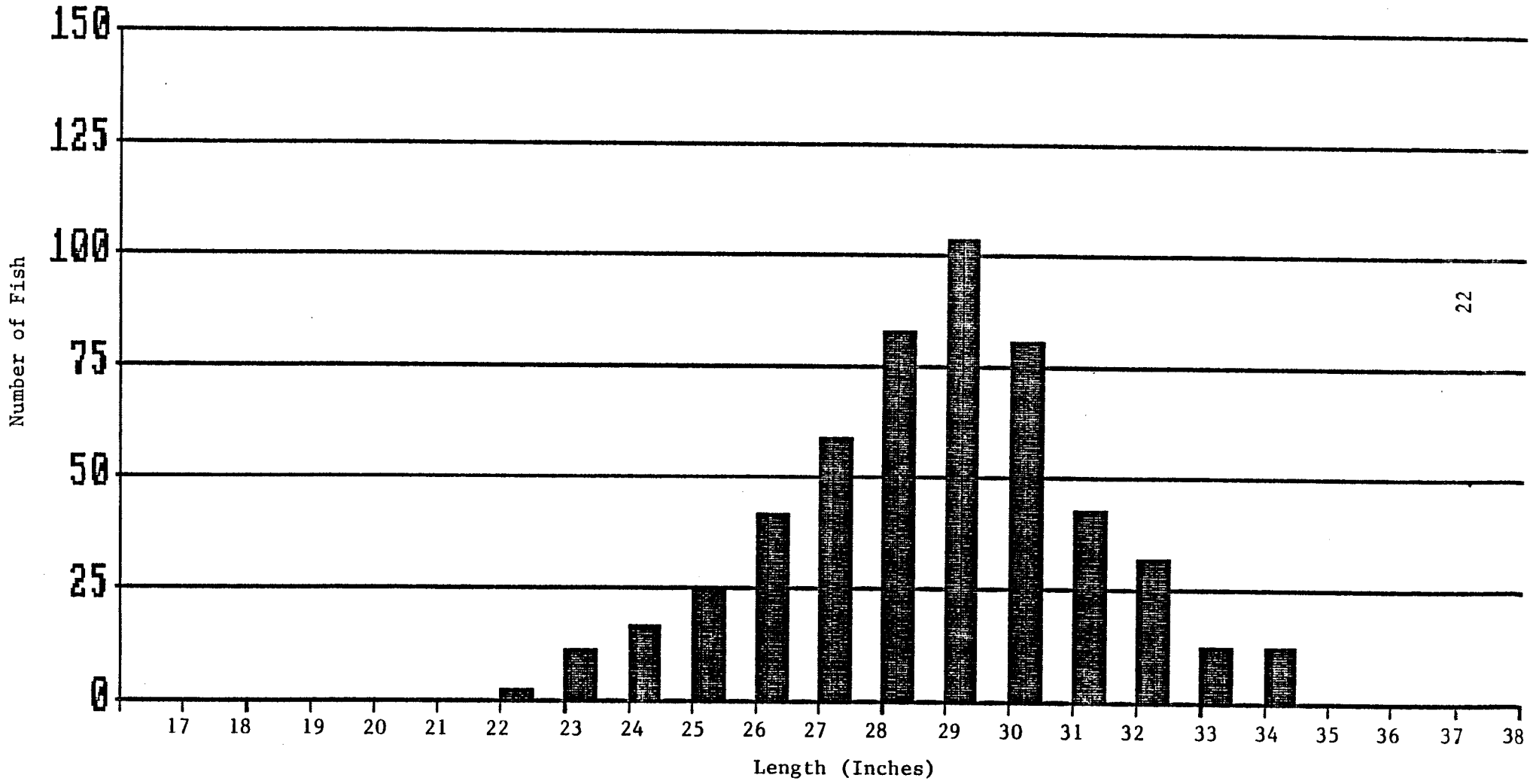


Figure 9. Run Timing, Adult Steelhead Trapped at East Fork Satellite, 1985.

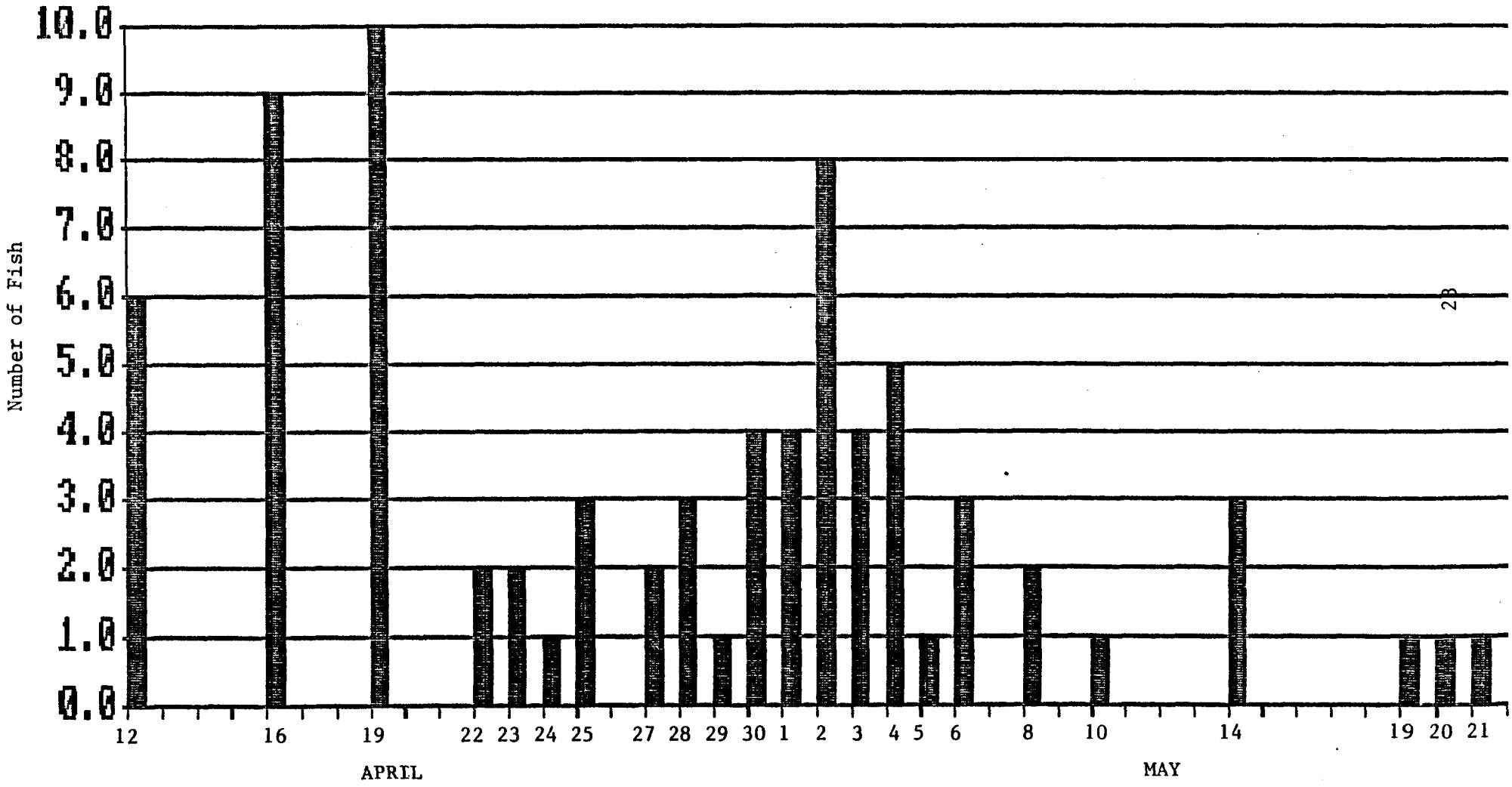
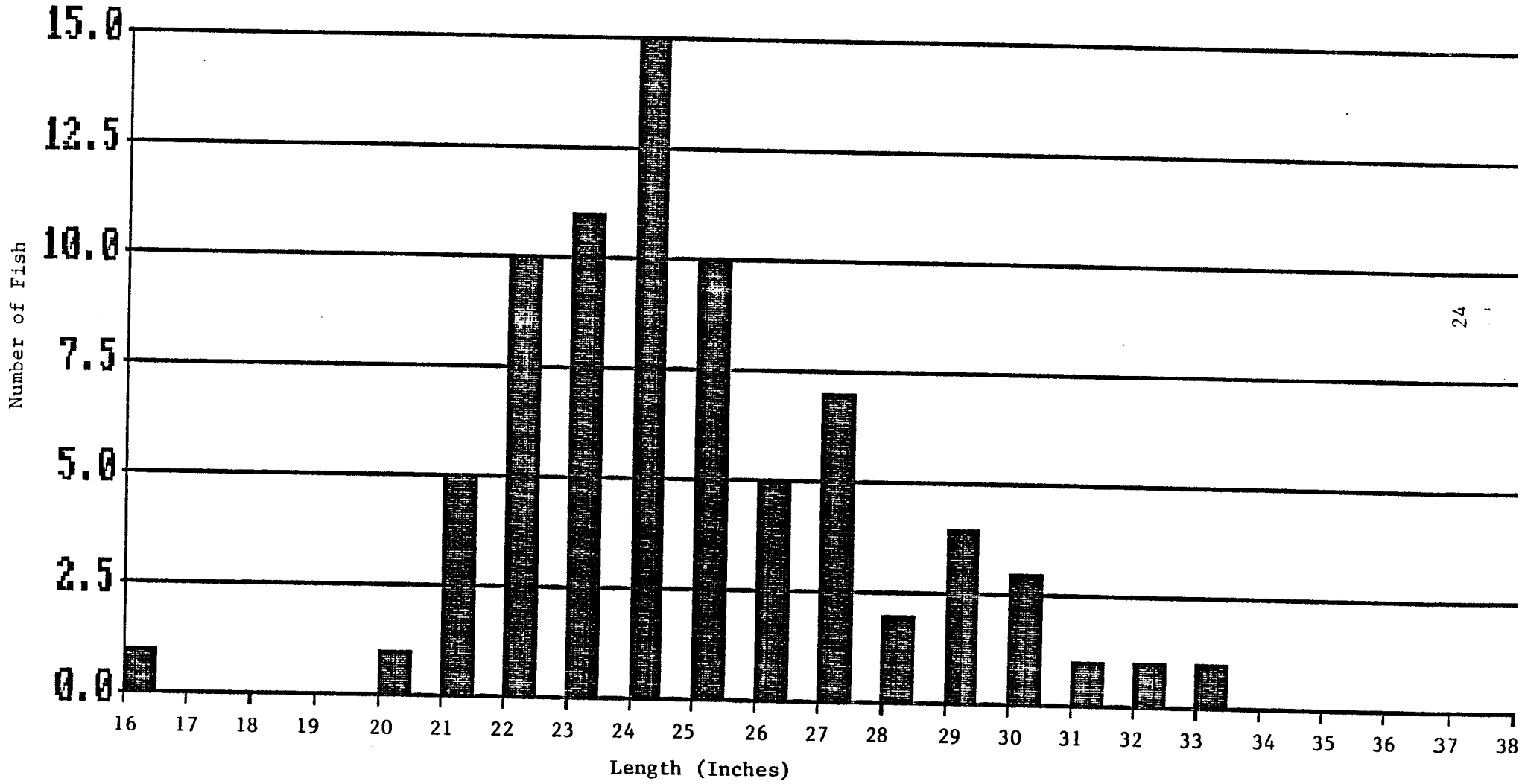


Figure 10. 1985 East Fork Steelhead Length Frequency.



Eggs were taken into a colander to drain off the ovarian fluid, then placed into a spawning bucket. Five females' eggs were then fertilized with the pooled sperm from five to seven males. The fertilized eggs were allowed to set for one to three minutes, then rinsed and water hardened in a 100 ppm Argentyne solution for one hour.

East Fork eggs were shipped to the incubation facility at Sawtooth Hatchery after water hardening. The eggs were placed in water in a cooler then iced to maintain the temperature at approximately 40 F.

FISH DISPOSITION

Three hundred and twenty Sawtooth steelhead kelts were given to the public, and the remaining 206 steelhead were released to spawn naturally.

Forty East Fork "A" steelhead kelts were given to the public, and the remaining 37 were buried. No "A" fish were released to spawn since "B" run steelhead are being used to build a naturally spawning run in this drainage (Table 9).

STEELHEAD EGGS

After water hardening, the Sawtooth eggs were put into the incubators at 70 ounces (approximately 16,000 eggs) per tray to eye for A's and 13,500 eggs per tray for B's. After 72 hours, all eggs were treated with Formalin at a rate of 1,667 ppm in a 15-minute drip, three times a week, until eye-up. The eggs eyed-up at 350 temperature units, at which time they were shocked by pouring them from one bucket to another. After 24 hours, the eggs were picked. Eyed eggs were then shipped to Hagerman National Hatchery or put back into the incubators at 8,000 eggs for A's and 6,750 for B's to hatch for fry plants.

An additional 2,753,242 green "A" eggs and 1,042,351 green "B" eggs were shipped to Sawtooth from the Pahsimeroi Hatchery to be used for egg shipments or fry planting.

After they eyed-up, we shipped 1,102,079 "A" eggs and 611,969 "B" eggs to Hagerman National Hatchery for rearing. We hatched and planted 2,188,160 "A" fry and 18,822 "B" fry into the upper Salmon River tributaries and the East Fork of the Salmon River. The fry plants were completed by July 15, 1985.

Table 9. Summary of fish spawned, fish released, kelt disposition for steelhead trout at Sawtooth and East Fork facilities, 1985.

Steelhead: Sawtooth Hatchery

Fish trapped: 526 (149 males, 377 females)(41 wild fish)

One-ocean A's:	77
Two-ocean A's:	390
B-Run:	59
Total	526

Fish disposition:

Females:
285 spawned and killed (given to public)
92 released

377 Total

Males:
35 ponded, spawned and killed (given to public)
114 released or spawned and released

149 Total

Fish disposal:

Given to public:	320
Released:	206
Total	526

Steelhead: East Fork

Fish trapped: 77 (47 males, 30 females) (6 wild fish)

One-ocean A's:'	50
Two-ocean A's:	24
B-Run:	3
Total	77

Fish released:

None released

Fish disposal: Given to public:	40
Buried:	37
Total:	77

SURVIVAL TO THE EYED EGG STAGE

	Green Eggs	Eyed Eggs	% Eye-Up
Pahsimeroi A's	2,753,242	1,892,822	68.7%
Pahsimeroi B's	1,042,351	536,346	51.4%
Sawtooth A's	1,516,294	1,286,517	84.8%
Sawtooth B's	102,461	87,633	85.5%
East Fork A's	122,612	110,900	90.4%
East Fork B's	7,128	6,812	95.6%
Totals	5,544,088	3,921,030	73.2%

SMOLTS PLANTED

Hagerman National Hatchery began planting both "A" run and "B" run smolts on March 26, 1986 and completed this operation on April 15, 1986. Sawtooth received 699,715 "A" run smolts at 4.45 fish per lb. for a total of 157,285 lbs. while the East Fork received 525,316 "B" run smolts at 4.68 fish per lb. or 112,322 lbs.

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